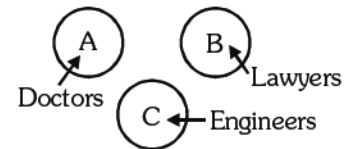CHAPTER **13** **Logical Venn Diagrams**

This section deals with questions which aim at analysing a candidate's ability to relate a certain given group of items and illustrate it diagramatically. Here are a few different types of Venn diagrams with their implications made clear.

Suppose you are given a group of three items. Then,

1. **If the items evidently belong to three different groups, the Venn diagram representing it would be as shown alongside.**
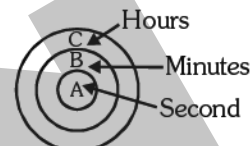
Ex. Doctors, Engineers, Lawyers

These three items bear no relationship to each other. So they are represented by 3 disjoint figures as shown in fig.

2. **If one item belongs to the class of the second and the second belongs to the class of third, then the representation is in the form of three concentric circles, as shown in fig.**
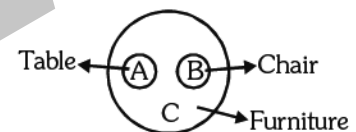
Ex. Seconds, Minutes, Hours

Clearly, seconds are a part of minutes and minutes are a part of hours. So, the Venn diagram would be as shown in the adjoining figure with circle A representing Seconds, circle B representing Minutes and circle C representing Hours.

3. **If two separate items belong to the class of the third, they are represented by two disjoint circles inside a bigger circle as shown in fig.**
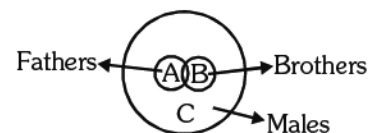
Ex. Table, Chair, Furniture

Clearly, table and chair are separate items but both are items of furniture. So, they would be represented as in the adjoining figure with circle A representing Table, circle B representing Chair and circle C representing Furniture.

4. **If two items belong to the class of the third such that some items of each of these two groups are common in relationship, then they are represented by two intersecting circles enclosed within a bigger circle.**
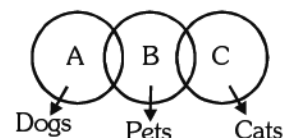
Ex. Males, Fathers, Brothers

Clearly, some fathers may be brothers and vice-versa. So, fathers and brothers would be represented by two intersecting circles. Also both fathers and brothers are males. So, the diagrammatic representation would be as shown in fig., with circle A representing Fathers, circle B representing Brothers and circle C representing Males.

5. **If two items are partly related to the third, and are themselves independent of each other they are represented by three intersecting circles in a line.**
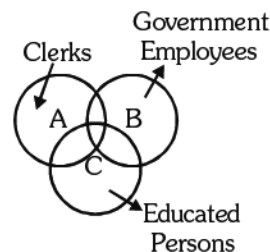
Ex. Dogs, Pets, Cats

Clearly, some dogs and some cats are pets. But all the pets are not dogs or cats. Also dogs and cats are not related to each other. So, the given items would be represented as shown in fig. with circle A representing Dogs, circle B representing Pets and circle C representing Cats.

6. **If the three items are partly related to each other, they are represented as shown in the adjoining figure.**

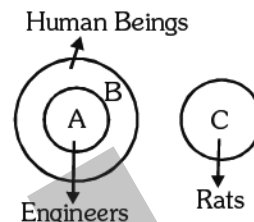**Ex.** Clerks, Government Employees, Educated Persons

Clearly, some clerks may be government employees and some may be educated. Similarly, some government employees may be clerks and some may be educated. Also, some educated persons may be clerks and some may be government employees. So, the given items may be represented as shown in fig. with three intersecting circles denoting the three classes.

7. **If one item belongs to the class of second while third item is entirely different from the two, then they may be represented by the adjoining diagram.**
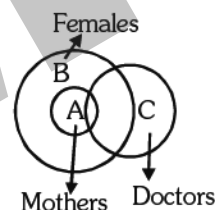
Ex. Engineers, Human Beings, Rats

Clearly, all engineers are human beings. This would be represented by two concentric circles. But the class of rats is entirely different from these two. Thus, these items would be represented as shown in fig. with circle A representing Engineers, circle B representing Human beings and circle C representing Rats.

8. **If one item belongs to the class of second and the third item is partly related to these two, they are represented as shown alongside.**

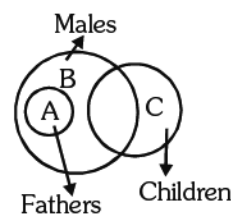**Ex.** Females, Mothers, Doctors

Clearly, all mothers are females. This would be represented by two concentric circles. But, some females and some mothers can be doctors. So, the circle representing doctors would intersect each of the two concentric circles. Thus, the diagram becomes as shown in fig. with circle A representing Mothers, circle B representing Females and circle C representing Doctors.

9. **If one item belongs to the class of second and the third item is partly related to the second, they are represented as shown alongside.**
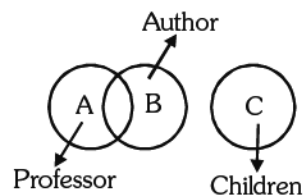
Ex. Males, Fathers, Children

Clearly, all fathers are males. This would be represented by two concentric circles. But, some males are children. But, children cannot be fathers. Thus, the diagram becomes as shown in Fig. with circle A representing Fathers, circle B representing Males and circle C representing Children.

10. **If two items are partly related to each other and the third item is entirely different from the two, they are represented as shown alongside.**

Ex. Professor, Author, Children

Clearly, some professors can be authors and vice versa. This would be represented by two intersecting circles. But the class of children would be entirely different from these two. Thus, the venn diagram would be as shown in fig. with circle A representing Professors, circle B representing Authors and circle C representing Children.
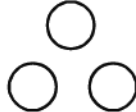
EXERCISE-1

Direction (Q.1 to Q.3) : Each of these questions below contains three groups of things. You have to choose from the following four numbered diagrams, the diagram that depicts the correct relationship among the three groups of things in each question.
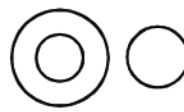

(1)   (2)   (3)   (4)

1.   Tables, Chairs, Furniture

2.   Tie, Shirt, Pantaloon

3.   Brinjal, Meat, Vegetables

Direction (Q.4 to Q.7) : In each of the following questions, there are three words which are related in some way. The relationship in each case is indicated by one of the four alternatives (1), (2), (3) and (4) given below. The alternative which best states the relationship is your answer.

(1) P includes part of Q and part of R but Q and R are independent of each other.

(2) P includes Q and part of R but Q is independent of R.

(3) P, Q and R include parts of one another.

(4) P includes both Q and R.

4.   Wheat, Loaf, Barley

5.   Singer, Writer, Actor

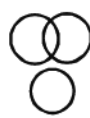6.   Widows, Males, Doctors

7.   Wood, Steel, Furniture

Direction (Q.8 to Q.13) : You are required to choose from the four diagrams marked (1), (2), (3) and (4) the one that represents the best relationship amongst the three:
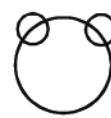

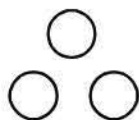(1)   (2)   (3)   (4)

8.   Males, Fathers, Mothers

9.   Pets, Dogs, Birds

10.   Shirts, Coats, Pants

11.   Students, Children, Animals

12.   Doctors, Surgeons, Lawyer

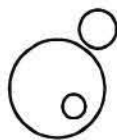13.   Doctors, Human beings, Medicines

Direction (Q.14 to Q.18) : Which one of the diagrams illustrates the relationship among three given classes? Size of the circles has no importance.
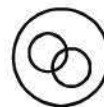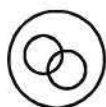

(1)   (2)   (3)   (4)

14. Mercury, Mars, Planets

15. Human beings, Teachers, Post-graduates

16. Sheep, Dogs, Wolf

17. Yak, Zebra, Bear

18. Antisocial elements, Pick pockets and Black mailers

BRAIN TEASERS

Direction (Q.19 & Q.20) : Which is the most suitable Venn diagram among the following, which represents interrelatiohship among the following?

19. Human beings, Foot ball players, Hockey players

20. Illiterate people, blind creatures, people who can read Hindi

(1)   (2)   (3)   (4)

ANSWERS

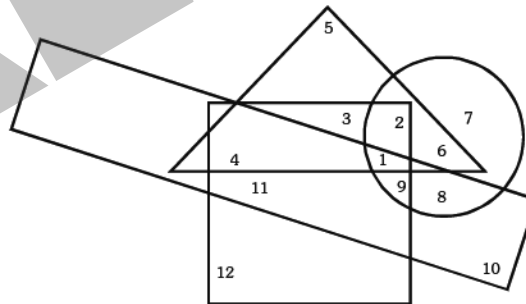| Que.	1	2	3	4	5	6	7	8	9	10
Ans.	3	2	4	1	3	1	1	2	4	1
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	3	2	2	1	4	2	2	4	1	3

EXERCISE-2

Direction (Q.1 to Q.5) : The following questions are based on the following diagram, in which the triangle represents female graduates, small circle represents self-employed females and the big circle represents self-employed females with bank loan facility. Number are shown in the different sections of the diagram. On the basis of these numbers given, answer the following :
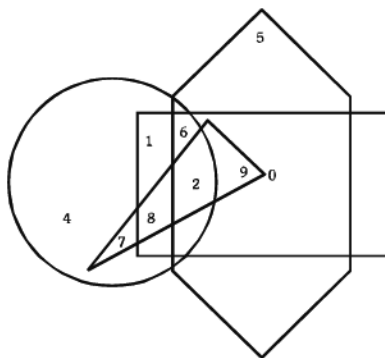

1. How many self-employed female graduates are with bank loan facility?

    (1) 5   (2) 12   (3) 7   (4) 20

2. How many non-graduate self-employed females are with bank loan facility?

    (1) 8   (2) 6   (3) 9   (4) 12

3. How many female graduates are not self-employed?

    (1) 4   (2) 12   (3) 10   (4) 15

4. How many female graduates are self-employed?

    (1) 13   (2) 12   (3) 20   (4) 15

5. How many non-graduate female are self-employed but not with bank loan facility?

    (1) 9   (2) 11   (3) 12   (4) 21

Direction (Q.6 to Q.10) : In the following figure, the circle stands for employed, the square stands for hard working, the triangle stands for rural and the rectangle stands for intelligent, Study the figure carefully and answer the questions that follow.

6. Non-rural, employed, hard working and intelligent people are indicated by region :

    (1) 8   (2) 9   (3) 10   (4) 11

7. Non-rural, employed people who are neither intelligent nor hard working are represented by region :

    (1) 12   (2) 11   (3) 10   (4) 7

8. Intelligent, unemployed and hard working non-rural people are indicated by region :

    (1) 11   (2) 6   (3) 9   (4) 4

9. Hard working non-rural people who are neither employed nor intelligent are shown by region :

(1) 8   (2) 7   (3) 6   (4) 12

10. Employed, hard working and intelligent rural people are indicated by region :

(1) 1   (2) 2   (3) 3   (4) 4

11. Which number is in all the geometrical figures?

(1) 9   (2) 6   (3) 2   (4) 8

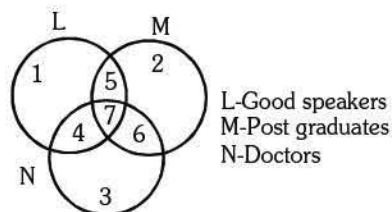**Direction (Q. 12 to Q.15) :** The following question are based on the diagram given below:

(1) The rectangle represents government employees.

(2) The triangle represents urban people.

(3) The circle represents graduates.

(4) The square represents clerks.

12. Which of the following statements is true?

(1) All government employees are clerks.

(2) Some government employess are graduates as well as clerks.

(3) All government employees are graduates.

(4) All clerks are government employees but not graduates.

13. Which of the following statements is true?

(1) All urban people are graduates.

(2) Some clerks are government employees but not urban.

(3) All government employees are clerks.

(4) Some urban people are graduates.

14. Choose the correct statement :

(1) Some clerks are government employees.   (2) No clerk is urban.

(3) All graduates are urban.   (4) All graduates are government employees.

15. Which number is in all the geometrical figures.

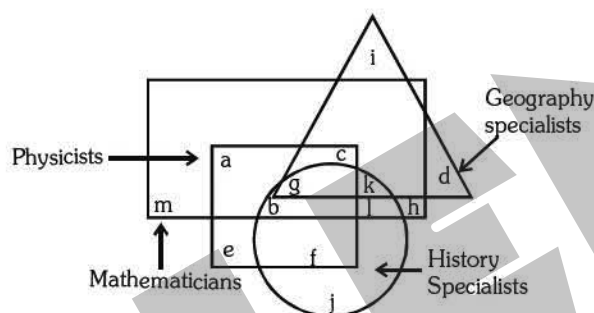(1) 7   (2) 8   (3) 3   (4) 6

😊 BRAIN TEASERS

16. Which number indicates good speakers who are neither post graduates nor doctors?

L-Good speakers
M-Post graduates
N-Doctors

(1) 6   (2) 2   (3) 5   (4) 1

Direction (Q.17 to Q.20): Each of the questions is based on the following diagram, In the diagram square represents Physicists, rectangle represents Mathematicians, Triangle represents Geography specialists while circle represents Historians.

17. Which of the following Mathematicians are not History specialist?

(1) a, m, h   (2) a, m, c, h   (3) l, k, h   (4) a, i, d

18. Which of the following are Geography or History specialists but not physicists?

(1) c, g, k   (2) k   (3) d, h   (4) l, h, d

19. Which of the following are Mathematicians, Physicists as well as Geography specialists?

(1) c, g   (2) b, k, c   (3) a, k, h   (4) l, h

20. Which of the following are Geography specialists, History specialist and Mathematicians?
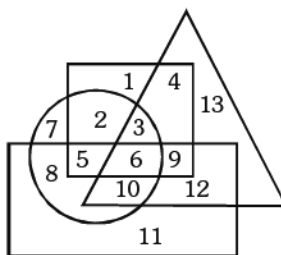
(1) c, i   (2) g, c   (3) m, h   (4) g, k

ANSWERS

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	1	2	1	1	3	2	4	1	4	1	3	2	4	1	4	4	2	2	1	4

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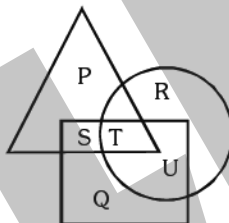
EXERCISE

QUESTIONS RELATED TO VARIOUS OLYMPIADS

1. In the adjoining venn diagram, the square represents women, the triangle represents persons who are in government services, the circle represents educated persons, and the rectangle represents persons working in private sector. Each section of the diagram is numbered then which number represents the uneducated women, who have government service as well as jobs in private sectors?
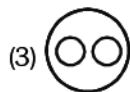
(1) 6   (2) 4   (3) 12   (4) 9

2. In the given figure, square represents doctor, triangle represents ladies and circle represents surgeons. Which letter represents the ladies who are both doctors and surgeons?
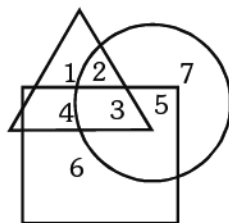
(1) U   (2) T   (3) S   (4) P

3. In the given question, three classes are given. Out of the four figures that follow, you are to indicate which figure will best represent the relationship amongst the three classes.

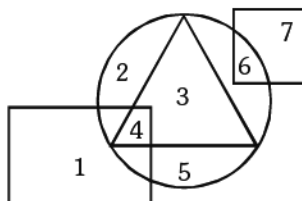"Boys, Students, Athletes"

(1)   (2)

(3)   (4)

4. In a given Venn diagram, triangle represents the healthy, square represents the old and circle represents the men. Which of the following regions represents the men who are healthy but not old?

(1) 1   (2) 2   (3) 3   (4) 7

5. In an organization of pollution control board, engineers are represented by a circle, legal expert by square, environmentalists by a triangle and doctors by rectangle. Which number shows Environmentalists with engineering background who are not doctors?

(1) 2　　　　　　　(2) 3　　　　　　　(3) 4　　　　　　　(4) 7

ANSWERS

Que.	1	2	3	4	5
Ans.	4	2	1	2	2